San Diego's Clean Energy Project

THE CITY OF SAN DIEGO

ENVIRONMENTAL SERVICES DEPARTMENT

PROJECT DESCRIPTION

Clean Energy

- ✓ Convert 77 heavy duty refuse packers to cleaner-burning Liquefied Natural Gas (LNG) to reduce emissions of nitrous oxide and diesel particulate.
- ✓ Convert landfill gas to Liquid Methane for use as a motor fuel in the City's LNG refuse packers to reduce greenhouse gas.

PROJECT DESCRIPTION

ESD Operations Center

- ✓ Acquire and renovate a site for use as a single Operations Center for the Department's refuse packer fleet.
- ✓ The new Center will facilitate the Clean Energy Project and enhance operational efficiencies.

CLEAN ENERGY PROJECT

- ✓ San Diego is an Air Quality Non-Attainment Area.
- ✓ Funding was obtained through a combination of grants:
  - Air Pollution Control District
  - The California Energy Commission
  - City contributions

37% Nitrous Oxide Reduction!

One LNG truck =
100 cars off the road

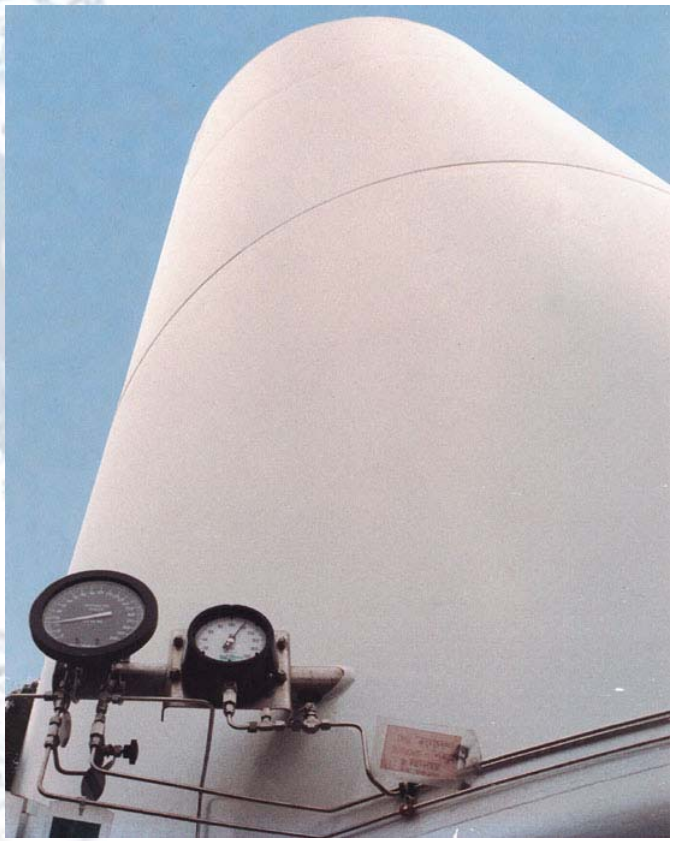
LNG REFUELING STATION

- ✓ Landfill gas conversion at Chollas Landfill
- ✓ 3,000 gallons per day
- ✓ Displaces marketplace LNG
- ✓ Fueling station floor also graded for secondary spill containment

LNG REFUELING STATION

- ✓ Reduces greenhouse gas by eliminating flaring at Landfill
- ✓ Economically viable
- ✓ Expansion option for 2nd 15K gal. tank
- ✓ Secondary fuel spill containment area

LNG REFUELING STATION



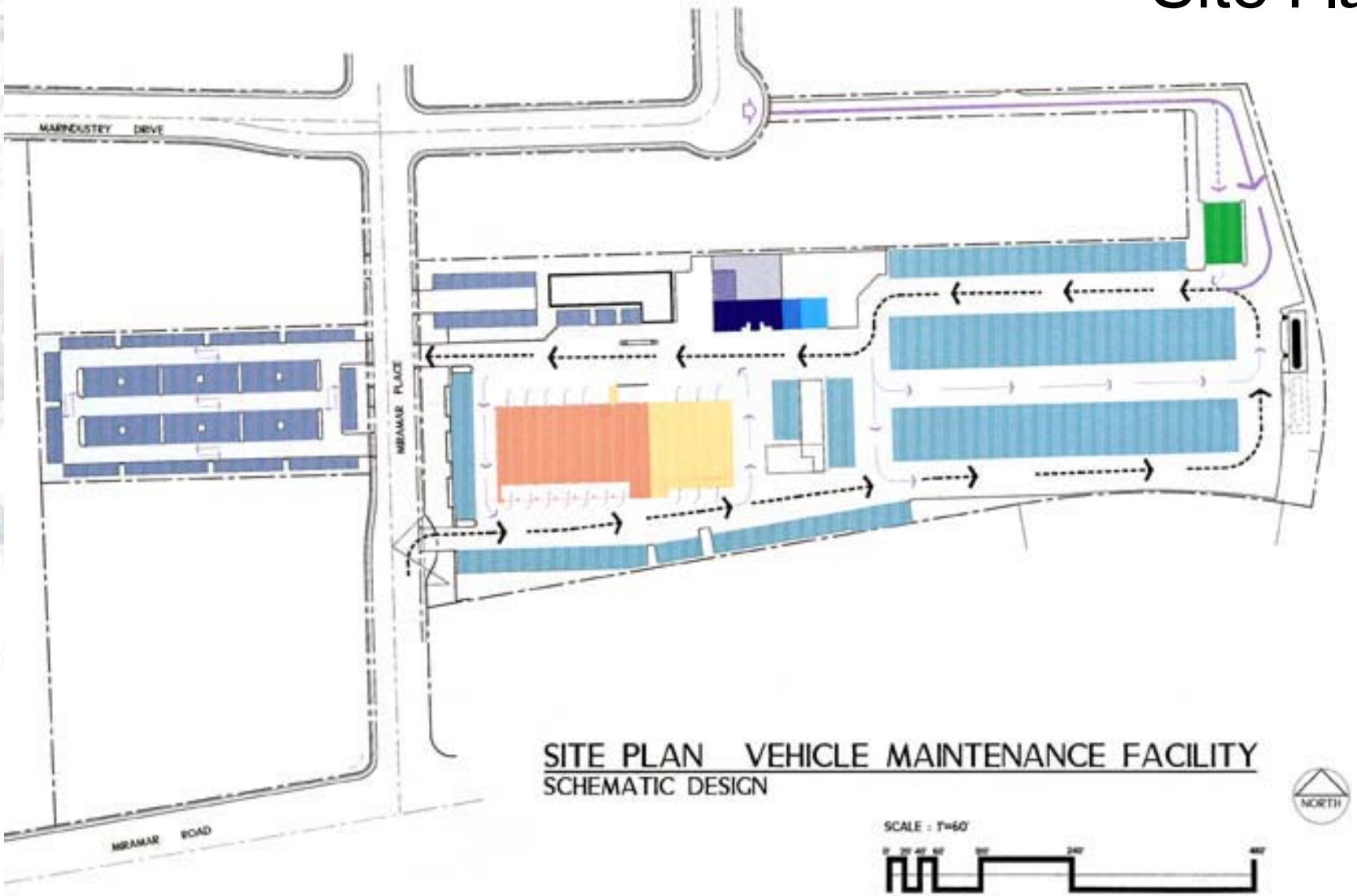
- ✓ 15,000 gal LNG fuel storage vessel
- ✓ Pressure and liquid gauges monitor fuel level and vessel pressure
- ✓ High pressure relief valve and safety disc mounted at top of vessel

ESD OPERATIONS CENTER

- ✓ The Department acquired and renovated a facility located at 8353 Miramar Place
- ✓ Renovation began February 2000
- ✓ Work completed Spring 2001
- ✓ Cost of acquisition and renovation: $18 million

ESD OPERATIONS CENTER

Site Plan



ESD OPERATIONS CENTER

8353 Miramar Place

After

Before

ESD OPERATIONS CENTER

- ✓ No open flame in building. Depicts hot water heaters used to heat building
- ✓ Parallel lift. One of two.
- ✓ Exhaust vent reel and high pressure vent line. Redirect gases out of building through roof

ESD OPERATIONS CENTER

- ✓ Exhaust tubing and high pressure vent line being installed in work bay prior to starting repairs.

ESD OPERATIONS CENTER

- ✓ Continuous fresh air circulation ducts throughout inside of maintenance facility.
- ✓ Keeps air circulating 24/7.

ESD OPERATIONS CENTER

- ✓ Exhaust hose, reel and vent line
- ✓ Fresh air circulation ducts
- ✓ All doors open automatically if methane is detected

ESD OPERATIONS CENTER

- ✓ Portable truck lifts accessible to all 17 work bays
- ✓ Bridge crane access
- ✓ Special mounting required for reels and all overhead equipment

ESD OPERATIONS CENTER

- ✓ 375 KVA 3-phase aux. generator backup power for:

A. Fuel stations
B. Methane detection system
C. Exit doors and lighting
D. Computer backup

ESD OPERATIONS CENTER

- ✓ MVE 119 gallon cryogenic fuel tank

1. Tank inspection for leaks or frosting
2. Filler nozzle ices up w/moisture or plumbing leaks
3. “Parker” type filler nozzle used on ESD’s fleet and fuel station

ESD OPERATIONS CENTER

- ✓ Cryogenic tank re-vacuum procedure in progress. Used to regain insulation properties lost on large portion of fleet
- ✓ Re-vac process takes about 24 hours to complete

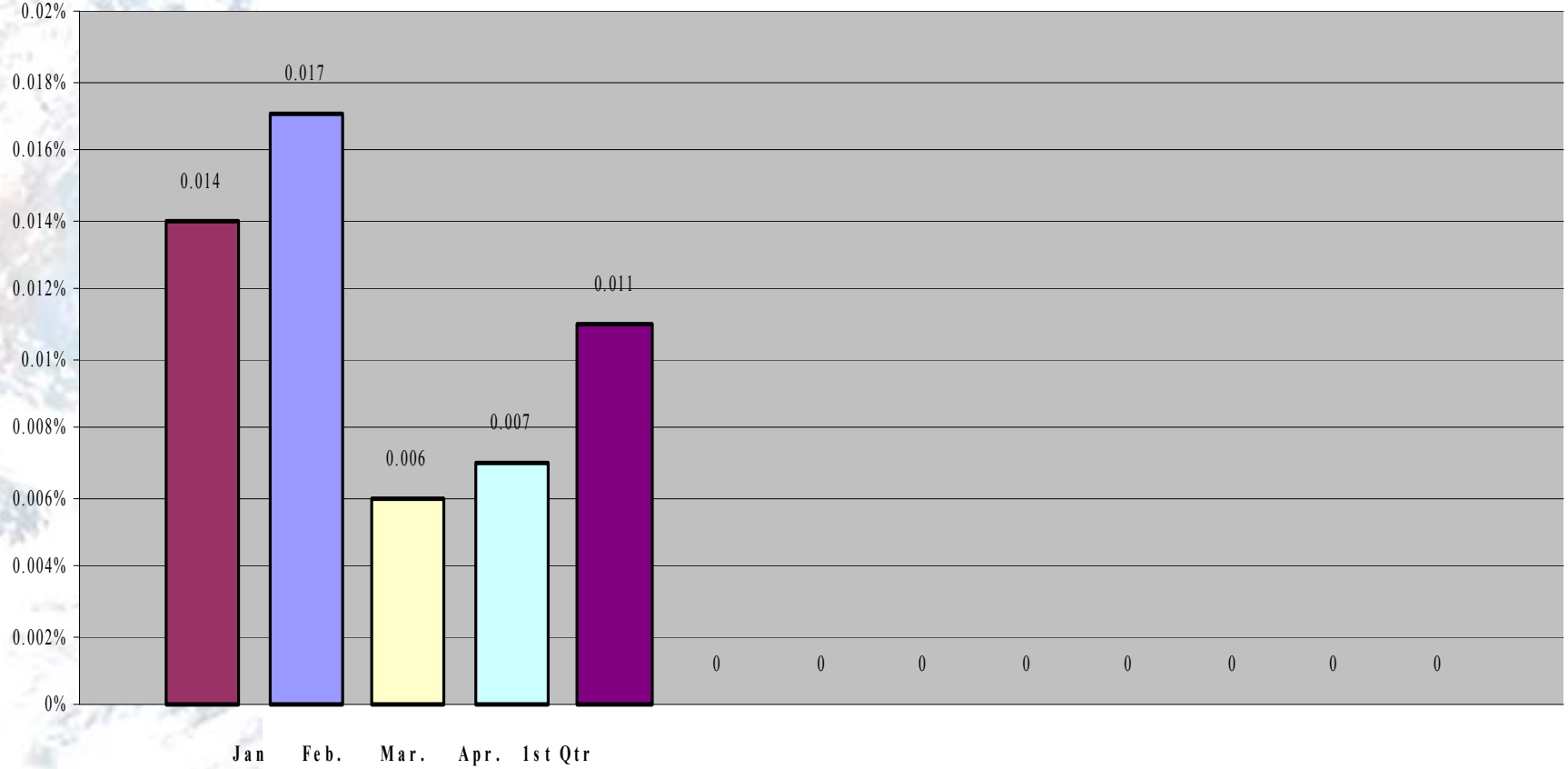
ESD OPERATIONS CENTER

- ✓ Aerial view of ESD's 11 acre facility
- ✓ Parking for 187 truck fleet
- ✓ New container storage area
- ✓ LNG fuel storage vessel

ISSUES / LESSONS

- ✓ Funding for infrastructure was insufficient
  - Maintenance facility modifications
  - Refueling Station
- ✓ Expect:
  - The unexpected
  - Training
- ✓ Maintenance Support
  - Infrastructure
  - Vehicle

Percent of LNG Trucks Out of Service for LNG Related repairs
2003



February 2003 Trucks "Not" Operating on LNG Fuel						
15% average for Month						
Date	**Converted Units not using LNG**	**Total units converted**	**Red tagged units (by shops) able to use LNG**	**Precent of trucks NOT operating on LNG fuel**	**CAP crew on site "Y " "N"**	**LNG repairs red tagged**
2/3/2003	18	73	2	25%	Y	1
2/4/2003	14	73	7	21%	Y	1
2/5/2003	10	73	6	15%	Y	2
2/6/2003	14	73	7	21%	Y	2
2/7/2003	12	73	9	19%	Y	1
Wk 2/3				**20%**	**100%**	**.019% R/T**
2/10/2003	9	74	8	14%	Y	1
2/11/2003	10	74	8	15%	N Rained out	2
2/12/2003	10	74	8	15%	Y	2
2/13/2003	11	75	10	17%	Y	2
2/14/2003	14	75	7	20%	Y	2
WK 2/10				**16%**	**80%**	**.024% R/T**
2/17/2003			Holiday		Y	
2/18/2003	10	75	7	15%	Y	1
2/19/2003	11	75	5	16%	Y	1
2/20/2003	12	76	6	17%	Y	1
2/21/2003	8	76	6	11%	Y	1
2/22/2003	6	76	8	9%	Sat. N	1
WK 2/17				**14%**	**100%**	**.013% R/T**
2/24/2003	7	76	8	10%	Y	1
2/25/2003	8	76	7	11%	Y	1
2/26/2003	6	76	10	9%	N	1
2/27/2003	7	76	4	10%	Y	1
2/28/2003	7	76	6	10%	Y	1
WK 2/24				**10%**	**80%**	**.013% R/T**

Total Equipment Out of Service for LNG Related repairs Month of February'03 .017%